Space Weather Forecast

Issued on Sunday, 03 September 2023 at 01:28 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: G1-G2 Moderate storms expected 03 Sep due CME arrivals and ongoing fast winds. Decreasing risk of Moderate flares.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Moderate with a long lasting Moderate flare from the sunspot that has now moved onto the northwest limb, and is soon moving onto the far-side. While currently impossible to analyse, magnetic looping is visible above the region in some satellite imagery (e.g SDO). The other four sunspot regions on the disc remain small and simple, and either stable or showing signs of decay.

The CME (coronal mass ejection) associated with the M3.3 flare of AR3413 is missing Earth. A further filament (line of plasma held together by the Sun's magnetic field) eruption was observed from the northwest disc around 02/1754 UTC. No CME has yet been identified from this eruption with the available imagery.

Solar Wind / Geomagnetic Activity: Ongoing coronal hole fast wind was further enhanced by an apparent transient enhancement from 02/0344 UTC. This may have been an early but also only glancing arrival of the CME from the eruption on the 30 Aug, however this remains uncertain. Observed solar winds were generally elevated at 550-600km/s, but increased to be strong at 650-750km/s between 02/0344 UTC and 02/1330 UTC. Total Interplanetary Magnetic Field (IMF) was Weak at first, but increased to Moderate for a time after 02/0344 UTC. The north-south direction was predominately negative (southward). Geomagnetic activity was initially Unsettled but became Active to G1 Minor Storm (Kp4-5) from 02/0300 UTC.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) continued to ease towards background after the S1 Minor Storm on 01 Sep, and remained well below the Minor Storm level.

Four-Day Space Weather Forecast Summary

Solar Activity: A chance of Moderate activity day 1 (03 Sep), from the Sunspot on the limb, but then easing to mainly Low activity as this rotates further onto the far-side. The other spots on the disc are currently smaller and simpler.

Solar Wind / Geomagnetic Activity: There are CMEs in the forecast. The first was expected to arrive 02/2200 UTC +/- 9hours and is from the eruption on 30 Sep, but may have already passed as the source of the transient enhancement 02/0300 UTC. The second is expected to arrive 03/0600 +/- 9hours, and is from the moderately fast CME which occurred 01 Sep. Ongoing CME influence is then likely into day 2, before easing. However winds are likely to remain elevated due to coronal hole sourced fast winds. Geomagnetic activity is expected to be Active with a chance of G1 Minor storm intervals expected at first day 1 (03 Sep), but with a chance of rising to give a spell G1-G2 Moderate storms, with any CME arrivals, and a slight chance of an isolated G3 Strong Storm interval. Conditions easing day 2 (04 Sep) onward to mainly Quiet to Unsettled with Active intervals, and a decreasing chance of G1 Minor Storm intervals.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy

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protons) is expected to slowly decline towards background levels with no further minor radiation storms expected.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	Yes	70	30	10	10
Strong	G3	No	20	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	50	20	20	30
Very Active	R3 to R5 X	No	5	1	1	1

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	10	5	2	2
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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